Early evidence that policy changes are working to reduce children’s obesity levels and daily “energy gaps”: Lessons for future research

- C. Tracy Orleans, PhD
- Amy Woodrum, BA and
- Tina Kauh, PhD, Robert Wood Johnson Foundation
- Y. Claire Wang, PhD, Columbia University Mailman School of Public Health
- Jim Sallis, PhD, University of California at San Diego

Note: Obesity defined as body mass index (BMI) greater than or equal to sex- and age-specific 95th percentile from the 2000 CDC Growth Charts.
Alarm bell sounds – “The first generation of children to live sicker and die younger than their parents.”

Depression
Cancer
Sleep Apnea
Cardiovascular Disease
Asthma
Diabetes

Premature Death
Arthritis
High Cholesterol
Reproductive Complications
High Blood Pressure


“Energy gap” of 110-165 kcal/day over 10 years, adding ~1 lb/year [600-1000 kcal/day, ~6 lbs/year for overweight/obese adolescents] (Wang, et al, Pediatrics, 2006)

“The epidemic may be leveling off” C. Ogden, 2008

Steep rise in research to discover policy/environmental solutions

Percent of nutrition, physical activity, and obesity abstracts at Society of Behavioral Medicine conference abstracts containing environmental or policy content (Sallis et al., *Annals of Behavioral Medicine*, 2013)
Broad-spectrum policy/environmental approaches are “working”: What can we learn from these “success stories”?
Amy Woodrum, RWJF

Prevalence and Trends in Overweight and Obesity among Mississippi Public School Students, 2005-2011

Changing course? Childhood obesity rates fall in major cities

Obesity in Young Is Seen as Falling in Several Cities


Morbidity and Mortality Weekly Report (MMWR)
Obesity Prevalence Among Low-Income, Preschool-Aged Children — New York City and Los Angeles County, 2003-2011

Percentage of overweight, obese students decreases in Anchorage

A Patchwork of Progress
Changes in Overweight and Obesity Among California 5th, 7th, and 9th Graders, 2005-2010

Prevalence and Trends in Overweight and Obesity among Mississippi Public School Students, 2005-2011
What do we know, and need to know, about how individual elements of broad-spectrum successes affect BMI and the “energy gap”? Tina Kauh, RWJF
How can we translate traditional behavioral outcomes into caloric and “energy gap” effects?
Claire Wang, Columbia University Mailman School of Public Health
How can we communicate emerging science and successes for policy impact? Jim Sallis, UCSD
DISCUSSION
Using Policy and Environmental Change to Close the Energy Gap

Rationale for the Approach

Amy Woodrum, BA, Laura Leviton, PhD, Tina Kauh, PhD, Neel Koyawala, Tracy Orleans, PhD, Diego Reinero, BS

Robert Wood Johnson Foundation

Marjorie Gutman
Gutman Research Associates

March 22, 2013
Presenting Author: Amy Woodrum
Society of Behavioral Medicine, 34th Annual Meeting & Scientific Sessions
Societal Trends Drive Changes in Eating and Physical Activity: Widening the Energy Gap
Disparities


NOTE: Obesity is body mass index greater than or equal to the 95th percentile from the sex- and age-specific 2000 CDC growth charts.

Where to focus?

**Macro-Level**
- Agriculture and economic policies
- Local public health programs, policies
- Local health care services
- National healthcare policy
- Food Industry action
- Government food assistance programs
- Food advertising and marketing
- Business incentives
- Portion sizes
- Societal and cultural norms

**Community and Organizational**
- Access to foods in schools
- Access to foods in communities
- Media and public education campaigns
- Federal education and childcare policies
- Parent training and education
- Exercise habits
- Psychosocial factors:
  - food norms
  - knowledge
  - skills
  - supports
- Biological factors:
  - age
  - gender
  - genes
  - physiology

**Home/Family**
- Exercise habits
- Parent training and education
- Portion sizes
- Access to foods in schools
- Media and public education campaigns
- Business incentives
- Portion sizes
- Societal and cultural norms

**Individual**
- Exercise habits
- Parent training and education
- Portion sizes
- Societal and cultural norms

**SOURCE:** Orleans, 2007
Where has this happened?

- CALIFORNIA: -1.1%
- NEW YORK CITY: -5.5%
- MISSISSIPPI: -13.3%
- PHILADELPHIA: -4.7%

Comprehensive Efforts

Calories Expended
- Physical education curriculum in public schools
- Physical activity policies in after-school settings
- Regulations to limit screen time in after-school settings
- Development of parks, open play spaces, and running trails
- Safe Routes to School policies

Calories Consumed
- Improved nutrition standards in public schools
- Increased access to farmer’s markets in low income neighborhoods
- Competitive food policies, including removal of sugar sweetened beverages, in schools
- Greater number of community gardens
Evolution of Tobacco Control

Adult Per Capita Cigarette Consumption

Number of Cigarettes


0 1,000 2,000 3,000 4,000 5,000

1st Smoking Cancer Concern

1st Surgeon General’s Report

Broadcast Ad Ban

Surgeon General’s Report on Environmental Tobacco Smoke

Master Settlement Agreement

Fairness Doctrine Messages on TV and Radio

Family Smoking Prevention and Tobacco Control Act

SOURCES: Centers for Disease Control and Prevention, United States Department of Agriculture, Tobacco Technical Assistance Consortium
Differences in...

- Competitive food policies
- School wellness policies
- Nutrition policies
- Physical activity policies
- Prevalence of parks and open spaces
- Existence of farmer’s markets

Lack of Common and Comparable Measures
Conclusions & Recommendations

■ Continue to fund policy and environmental research

■ Develop a common framework and methods to further this research

■ Convert behavioral interventions into population-wide impacts
Success Stories from Policies and Environmental Changes to Close the “Energy Gap”:

Lessons Learned to Inform Childhood Obesity Policy and Research

Tina J. Kauh, PhD; Laura Leviton, PhD; Amy Woodrum, BA; Neel Koyawala; C. Tracy Orleans, PhD (Robert Wood Johnson Foundation)

Marjorie Gutman, PhD (Gutman Research Associates)
Rationale
Socio-Ecological Model

- **Macro-Level**
- **Community/Organizational**
- **Home/Family**
- **Individual**
Energy Gap

Average daily *surplus* of calories consumed to calories expended, over and above levels needed for healthy growth and development (*Wang et al.*, 2006; *Wang et al.*, 2012)

Identifying Effective Single-Component Interventions on BMI or the Energy Gap
Review Process

1. Scan Literature
2. Prepare Nominations
3. Apply Selection Criteria

Successful Single-Component Interventions
Selection Criteria for Successful Interventions

- Strength of Study Design
- Plausible Link to Impact
- Feasibility for Implementation
- Applicability to High-Risk Populations
- Clearly Defined Strategy

Impact* on BMI, kcal**

*Impacts must be statistically significant (p<.05)
**kcal must either be reported directly or be estimable based on other data reported.
Successful Interventions
Title IX enacted in 1972

Between 1970-71 and 1977-78**:
- 20% increase in girls’ high school sports participation
- 24% increase in physical activity
- 3.8% decline in BMI
- 5% decline in probability of being overweight
- 4.2% decline in probability of being obese

Changes sustained 25 years later:
- Obesity rate = 1.5% lower**

**all statistically significant changes
State Laws on Competitive Foods*

- Standards for competitive foods in CA schools (Senate Bills 12 and 965, implemented July 2007)

- Competitive Foods
  - Unhealthy: sugar-sweetened beverages (SSBs), candy, chips
  - Healthy: water, low-fat milk, fruit

- By 2008: decline** in per capita consumption of SSBs, chips, candy (compared to previous school year)

- By 2010: lower daily at-school consumption of unhealthy competitive foods (compared to students in states w/o competitive food laws):
  - 170 fewer calories**
  - Also: 6.5 fewer grams of fat**, 12.5 fewer grams of sugar**

*Taber, Chriqui & Chaloupka (2012)
**statistically significant
Removal of SSB’s in Homes*

- 103 Boston families
  - adolescent (aged 13-18)
  - consumed at least 1 daily serving of SSB

- Randomized-controlled trial
  - Control = continue current SSB consumption patterns
  - Tx = stop SSB consumption for 25 weeks + four daily servings of either water or diet beverages

- After 25 weeks
  - Overall: 286 fewer daily calories from SSBs**
  - Among overweight/obese: INCREASE in BMI of 0.12 kg/m$^2$ among Controls; DECLINE in BMI of 0.63 kg/m$^2$ among Tx**

*Ebbeling et al. (2006)
**statistically significant
Schoolyard Renovations*

¬ Types of schoolyards:
  • Traditional schoolyards needing repair (“asphalt jungles”)
  • Updated multi-use schoolyards (“Learning Landscapes”)

¬ More physical activity at Learning Landscape schoolyards**
  • Higher student traffic
  • 1.86 times more energy expended → 119 pounds avoided per week!

¬ Necessary assumptions about participants:
  • Weight
  • Age
  • Length of physical activity

*Brink et al. (2010) with estimated energy expenditure conducted by David Kahan.
**statistically significant
Lessons Learned
Limitations & Recommendations

Researchers

Policy-makers

What you want to say.

What they're interested in.

Relevance

(BMI, Calories Consumed, Calories Expended)
Limitations & Recommendations
A technological innovation for estimating policy effects on childhood obesity levels & Healthy People 2020 goals

Y. Claire Wang, MD, ScD
Amber Hsiao, MPH
Michael Slaven, MA
Steven L. Gortmaker, PhD

Funded by the Robert Wood Johnson Foundation Grant #57891
How Can We Reach the Healthy People Goals?

Prevalence of Obese, Age 2-19
Close the Energy Gap

Goal

- Establish a common metric to evaluate potential impact of programs and policies at the population level
  - Addressing both sides of the energy balance equation
  - Accounting for Reach, Frequency, Intensity
- A user-friendly tool for dissemination
Average Caloric Impact (ACI)

- Depends on
  - Age Group, Sex, % Impacted
  - Empirical/Modeled
- For activity-based programs:
  - Average body weight
  - Baseline activity level
  - Intensity (METs), Frequency, and Duration
- For diet-based programs:
  - Baseline consumption pattern
  - Calories reduced
Evidence Review

Recently-Published Reviews of Dietary, Physical Activity (PA), and Other Interventions

67 studies
(2000-2009)
from Transtria, LLC

22 studies
(1996-2012)
from iterative review

60 Studies Excluded

7 Studies Included

12 Empirical

10 Estimates

29 Studies Informed 15 Interventions
(7 Empirical, 8 Modeled)

* Studies excluded were not sufficient to inform a caloric impact
Example 1: Adding PE Time by 15 min/day in middle schools

- On average, middle-school PE classes have a MET value of 3.6 (McKenzie 2004)
- Mean weight for 12-14 year olds in the US: 71.2 kg (157lbs) (NHANES 2009-2010)
- Calculated basal metabolic rate (BMR): $18.045 \times 71.2 + 495.1 = 1,536.3$

$$\text{ACI} = \frac{(\text{BMR} \times \text{MET} \times \text{Duration})}{1,440 \text{ min/day}} \times \frac{180 \text{ school days}}{365 \text{ days}} = \frac{(1536.3 \times (3.6 - 1.0) \times 15 \text{ min/day})}{1,440 \text{ min/day}} \times \frac{180 \text{ school days}}{365 \text{ days}} = 20.5 \text{kcal/day}$$
Example 2: Replace SSBs with Water in High Schools

SSB: Sugar-Sweetened Beverages

- An average US teen 15-18 years of age consumes **301 kcal/day** of SSBs
- **10.3%** of SSBs consumed in schools
- Assuming no compensation

\[
\text{ACI} = \frac{301\text{kcal/day} \times 10.3\% \times 180\text{ school days}}{365\text{ calendar days}} = 15.3\text{kcal/day}
\]
Strengths, Limitations, and Target Audience

- Translate traditional behavioral outcomes (e.g. number of steps, minutes of MVPA) into ACI/energy gap metrics
- Analytical framework for measuring population-level impact
- Availability & quality of evidence, necessary assumptions, applicability to subgroups
- Researchers, practitioners, policymakers
Caloric goals by race-ethnicity

Caloric goals by income

For high school boys and girls, we need to cut **217 kcal/day** to reach the Healthy People 2010 goals.
Thank you

Y. Claire Wang, MD, ScD
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Active Living Research
Building the Evidence to Prevent Childhood Obesity and Support Active Communities

Communicating Research for Policy Impact

James F. Sallis, Ph.D., Active Living Research, UCSD

For SBM Symposium
March 2013
Benefits/ Drawbacks of using common metrics related to calories, BMI and the “energy gap”

- Intervention effects are comparable
- Their separate and combined effects can be understood and communicated
- They convey that multiple small changes add up
- They aid in communication to non-researchers
- But they do not capture other critical contributions to health – PA and Healthy eating are vital for healthy growth and development in other ways
Growth in SBM research and policy action

- SBM and its members are more committed to making an impact. This started with contributions to tobacco control a generation ago.
- Environment and policy research on diet, PA, and obesity at SBM has grown over the past 10 years, making our work more policy relevant.
- SBM has an active policy committee and retains a public policy firm.
- In 2011 SBM board members made Capitol Hill visits!!
- Translational Behavioral Medicine is building a policy-relevant database and educating members.
“Success stories” can start the communication

- Patchwork of Progress report shows some California counties are making big strides in reducing childhood obesity.

- Reports of obesity decreases in NYC, Philadelphia, Mississippi and elsewhere attracted wide media coverage
  - Translates and communicates research in accessible ways
  - Generates high levels of interest among policy makers, parents and the public interested in finding out “what works” -- especially in their own communities
  - Gives us opportunities to address the comparative and combined effectiveness, cost effectiveness and feasibility of varied interventions -- which using common metrics like BMI and calories can help us determine
Estimated Energy Expenditures for School-Based Policies and Active Living

David R. Bassett, PhD, Eugene C. Fitzhugh, PhD, Gregory W. Heath, DHSc, MPH,
Paul C. Erwin, MD, DrPH, Ginny M. Frederick, MS, Dana L. Wolff, MS,
Whitney A. Welch, MS, Aaron B. Stout, MS


• ALR Commissioned Analysis
• Substantial media coverage
• Lay summary on ALR website

Minutes of MVPA Gained Per Day

- Mandatory Physical Education: 23
- Classroom Activity Breaks: 19
- Walk/Bike to School: 16
- Parks (Renovated): 12
- After School Activity Programs: 10
- Standardized PE Curricula: 6
- Modified Playgrounds: 6
- Modified Recess: 5
- Parks (Access): 1
Use media-like infographics

THE ROLE OF
Parks and Recreation
IN PROMOTING PHYSICAL ACTIVITY

RACIAL DISPARITIES
70% of African-American neighborhoods lack recreation facilities, compared to 38% of white neighborhoods.
81% of Hispanic neighborhoods lack recreation facilities, compared to 38% of white neighborhoods.

PROPERTY VALUES
Homes near parks can sell for up to $2,262 more than homes without parks nearby.

OPEN SPACE
Youths in neighborhoods with 7 recreational facilities were 26% more likely to be active 5 times per week than those in areas without facilities.

TRAILS
A study in Nebraska found that for every $1 spent on trails, there was almost $3 in savings in direct medical costs.

Lessons We Are Learning

- Simplify our results. Next step for Active Living Research is self-assessment checklists.
- Provide training to investigators who are uncomfortable or unfamiliar in translation role – SBM training sessions in talking with media, story telling
- Create permanent “translation” products in multiple media – syntheses, policy briefs, infographics, social media
- Promote findings via traditional & new media – twitter
Translating research for policy and practice change
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Next Steps for Communicating with Non-Researchers

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